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Evaluation of a Sexual Risk Calculator

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I. Introduction

Sexually transmitted diseases [STD's], including syphilis, gonorrhea, chlamydia, herpes and the human papilloma virus, actively affect the public health; approximately 19 million new cases of STD's appear each year in the United States alone with almost half of these occurring in adolescents and young adults (ages 15-24; Centers for Disease Control and Prevention [CDC], 2008). Sexually transmitted diseases occur at an alarmingly high rate in adolescents and young adults. Treatment of STD's for the age group of 15-24 annually costs the United States around 6.5 billion dollars a year (Chesson et al., 2004). The most cost-effective way of treating STD's is prevent them from ever occurring in the first place. Promotion of safer sex practices is important as STD's can have long term negative impacts on an individual's health and on any sexual partner's that individual may have. Negative effects of STD's include infertility, painful itching or irritation in the pubic areas, and a decrease in psychosocial confidence and well-being (CDC, 2008).

Research shows that current prevention programs are effective at increasing knowledge but the actual impact on risk taking behaviors is not significant (von Sadvoszky, Brown, Kovar, & Armbruster, 2006). It is also known that some young adults have a misconception as to what is meant by "unsafe" sex. A sexual risk calculator has been created for the military but it may also be useful in the civilian population. More information is needed as to how this civilian population would accept and use such a tool and also what their perceptions of their own sexual risk behaviors are as compared to their actual sexual risk behaviors. This is significant to

nurses as the prevention of STD's is daily becoming the preferred method of treatment and any sex educator needs to be aware of how young adults perceive their sexual risk.

The purpose of this study was to evaluate a sexual risk calculator designed to increase awareness of sexual risk behaviors. It is hoped that by tailoring a prevention/intervention program specifically to the needs and desires of young adults there is a greater likelihood that not only will the information given be retained but also that risky sexual behaviors will decrease.

II. The Review of the Literature

A. Incidence of STDs

The rates of STD's in the United States are at pandemic proportions. According to the Centers for Disease Control [CDC] (2007), the overall incidence of Chlamydia infections was 370.2 per 100,000 persons; this was a 7.5% increase as compared to 2006. In the United States the chlamydia rate is almost three times higher for women than for that of men; The CDC (2007) attributes this difference to a lack of screening in males; this data shows that the partners of women with Chlamydia are not being diagnosed or reported as having the disease. However, looking at the data between 2003 and 2007, chlamydia rate infection increased by 42% for males as compared to 17% for females, indicating that screening and diagnosis rates are increasing in males (CDC, 2007). Chlamydia infection rates are highest in females age 15-19 and second highest in ages 20-24 while Chlamydia rates in men are highest in ages 20-24 (CDC, 2007). Data shows that the Gonorrhea rate was also slightly higher for women than for men although the incidence rates between the sexes are much closer in Gonorrhea than they are in

Chlamydia. The same incidence rates in regards to age occur in Gonorrhea as in Chlamydia.

The presence of either Chlamydia or Gonorrhea also makes an individual more susceptible to HIV infection (CDC, 2007). As seen from this data, young adults and adolescents are at greatest risk for contracting an STD and engaging in risky sexual behaviors such as having multiple sexual partners, lack of use of condoms, and lack of knowledge about STD's can all increase an individual's risk for contracting an STD.

B. Theoretical Background

During the time of life between ages 15-24, young adults go through several life changes such as puberty and leaving high school and moving to a college and adult life. It is a time of high stress and may involve periods of low social support when transitioning from one location to another. Abraham Maslow (1943) in his paper, "A Theory of Human Motivation," with his famous pyramid of the factors which motivate humans speaks of how all humans have five sets of goals, which he labels "the basic needs": physiological needs, safety, love, esteem, and self-actualization. Maslow (1943) then describes how these goals are interrelated and built upon a hierarchy of prepotency; the goal most important at the time will consume a person's consciousness and the other needs will be forgotten until this principal goal is achieved or sated; as each need is satisfied, the next layer of the pyramid becomes the need waiting to be fulfilled.

Maslow's theory of human motivation may help to illuminate why these young adults engage in risky, sexual behaviors while going through this time of emotional upheaval. Sex can be viewed as a basic physiologic need, a part of the base of Maslow's pyramid and therefore having the strongest pull on the actions of humans. But in truth, sexual behavior is determined

by multiple needs, not only the need for sex but also the need for love and affections (Maslow, 1943). Sex can also be determined by the need for safety and can even fulfill the need for esteem. Young adults may use sex as a means of finding intimacy or closeness. In their depression or desperation to find social support, they may engage in risky sexual behaviors. This need for love, intimacy, or acceptance is singular in that it is a two-sided need; people need to both receive and give love in order for this need to be completely satisfied (Maslow, 1943). Also, fulfillment of the love, affection, and safety needs can also lead to a higher risk of sex occurring. When a person has these needs fulfilled and feels safe and loved, they are less likely to realize or take heed of the fact that they might be engaging in risky, sexual behavior. It is important to understand that this hierarchy is not completely fixed and in certain cases, the needs do not follow the pattern indicated in this theory (Maslow, 1943).

C. Risk Behaviors

In a study by Mazzaferro, Murray, Ness, Bass, Tylus, and Cook (2006) that had a large sample size (n=43) comprised of females where the mean participant age was 18.8, it was found that 65% reported having two or more sexual partners in the past year. Multiple sexual partners increase the risk of contracting an STD; 39% of the sample stated a prior history of sexually transmitted infection and of the 203 sample participants who received STD testing, 15% had a chlamydial or gonococcal infection. Also, 75% reported that they did not always use a condom during sex. The study also found that high levels of depression, high levels of stress, and low levels of social support were each associated with high-risk sexual behaviors and STD's (Mazzaferro et al., 2006). If we take Maslow's theory of human motivation and apply it to this data, it may show that because the psychosocial, love and belonging needs of these teenagers

are not being met, it leads to increase in high-risk sexual behaviors and hence a higher rate of STD's as these teenagers look for fulfillment and belonging in sexual behavior.

Sexual encounters are emotional encounters. They are complex and can confuse the participants. A descriptive study to identify the emotions involved in college students' safer and risky sexual encounters was conducted by von Sadvoszky, Vahey, McKinney, & Keller (2006) with 84 participants ranging in age from 18-20; 55 were female and 27 were male and all of the participants were heterosexual with a majority being Caucasian and speaking English as their first language. The participants answered a 27 open-ended and close-ended questionnaire; riskiness of the sexual encounter was assessed with Approximations to Risky Sexual Intercourse Measure (ARSI). In the study, 60 participants were placed into the risky group because they had participated in oral, vaginal, and/or anal intercourse without using a condom. The other participants were placed into the safer group. The most frequently reported thought or emotion in the risky group regarding the participant's partner was a feeling of love (von Sadvoszky et al., 2006). This relates straight back to Maslow (1943) and the interpretation that young adults may engage in sex due to a feeling of love for their partner. Approximately the same amounts of positive emotions after the encounter were reported for both the risky respondents and the safer respondents. The study found that the types of emotions after the encounter were not related to the risk experienced within the encounter. This showed that there was no regret for having a risky encounter and exposing oneself to the potential consequences of contracting an STI (von Sadvoszky et al., 2006). This may also indicate a lack of knowledge regarding what defines risky sexual behaviors.

In another study conducted by von Sadvoszky, Keller, & McKinney (2002), it was found that the planning of an encounter did not lead to safer sex practices and many participants had inaccurate perceptions of whether they practiced safer sex. Over half of the participants mistakenly believed they had safe sex when in fact they exhibited unsafe sex practices. The main reason participants believed an encounter was safe was the use of a hormone-based contraception such as pills. Another common reason for perceiving the encounter as safe was the use of a condom during vaginal intercourse. No participants stated asking about their partner's sexual history, examined their partner for genital sores, or refrained from using alcohol or drugs before their sexual encounter. Interestingly, only those who perceived they had exhibited unsafe sex practices believed so because they had not used a condom during either oral or vaginal sex (von Sadvoszky et al., 2002)

D. The Need for a Sexual Risk Calculator

Von Sadvoszky, Kovar, Brown & Armbruster (2006) conducted a descriptive, cross-sectional design to ascertain young adult's perceptions of previously received knowledge on sexual health behaviors. They had a sample of 55 adolescents and young adults with a mean age of 22.2; most participants were female and in college. Two questionnaires were used to gather information about demographics, from which the participants had received past information, what types of information they had received and how the past information had influenced their sexual behavior (von Sadvoszky et al., 2006). The study found that the primary place young adults received sexual education was high school and none of the participants states that they had received information about STD's from their parents. In the study, 45% did not remember specific details about any specific STD and of note more than 50% of the sample did

not remember receiving information on how to protect themselves from undesired consequences of sexual intercourse. More than half of the sample stated that prior information received did not influence their current sexual behavior and 17% felt that nothing they had learned in their past sex education classes was useful.

In summary, it is clear young adults experience a lack of knowledge regarding STD's and risky sexual behaviors; in spite of this knowledge deficit or perhaps because of it, they are the age group most likely to engage in risky sexual behaviors and contract an STD. There is a gap in their knowledge regarding STD's and how to prevent them; therefore, it is necessary to make these young adults cognizant of their risk status and increase education regarding what the complications of unprotected sex can be because as it stands presently, a significant amount of young adults do not understand or know that they are even participating in risky sexual behaviors and are therefore at risk for contracting an STD.

The purpose of this study was to evaluate a sexual risk calculator that calculates an individual's risk of participating in risky sexual behaviors. It can also be used to determine the riskiness of past sexual encounters. The researchers wanted to gain further insight in to:

1. What were the participants' perceptions of the calculator?
2. What were participants' reactions to their calculated risk?
3. How accurate were participants in calculating their risk?
4. What was the relationship between calculated risk and condom use at the last sexual encounter?

Through these questions, the researchers hope to increase knowledge of young adult's perceptions of their sexual risk as compared with their actual sexual risk levels and to determine the efficacy of the sexual risk calculator tool in this population.

III. Methods

The sample for the overall study was made up of seventeen participants ($n=17$) consisting of four males and thirteen females. They were recruited from a local university campus through two means: through an advertisement in the local university newspaper and through fliers posted in dorms and around the campus.

Interested individuals contacted the principal investigator through e-mail. A return e-mail was sent describing the study, its purpose, and types of questions the subject could expect to be answering. Another e-mail was then sent describing different data collection times and the subject signed for a certain time slot. A reminder e-mail was then sent twenty-four hours before their appointed time.

During data collection, individuals were given the informed consent paperwork and after reading it through, signed the informed consent documentation sheet and handed it to the co-investigator who placed it in a separate envelope. They were told that if they had any questions about the study throughout the collection time period, they and the principal investigator would go into another room to address their concerns.

Data collection began with a demonstration of the interventions by the principal investigator and the co-investigators. Specifically, the investigators explained the sexual risk calculator. After the demonstration, the individual was given the questionnaire; if there were

more than one participant in the same data collection time, they were placed in separate places through out the room where they filled out the questionnaire. They answered questions regarding their responses to the intervention, general sexual health information, and any needs or desires for further education. The individuals also had the opportunity to examine the intervention at their own leisure. No verbal interaction occurred between the participants unless there were questions regarding the questionnaire or the sexual risk calculator.

After completing the questionnaire, the subjects placed them into a large manila envelope and then placed it into a box with other manila envelopes in it to ensure that the investigator would not know which envelope contained their questionnaire. This was done to ensure patient confidentiality.

Participants were then asked if they had any final questions regarding the study. The participants were then handed the debriefing letter in which was included their incentive, a 10 dollar gift certificate to either Starbuck's or Barnes & Noble. If there were no further questions, the study participant or participants were free to go and the co-investigator carried the questionnaires to a locked office where they were kept for safe keeping.

IV. Results

Sample demographics were collected through the questionnaire. The participants filled out questions regarding their age, ethnic background, and gender. There were 18 participants in total. Results for age were measure in mean and standard deviation and age and gender were measured in ratios. The sample turned out to be predominantly female, white and young adult.

The following graphs indicate the various ratios within the demographic data that were pertinent to the study.

Demographic Data

Age M(SD)	21.8(3.6)
Caucasian (%)	77.8
Female (%)	83.3

Ever Had:

Vaginal Sex (%)	77.8
Oral Sex (%)	61.1
Anal Sex (%)	44.4

The results of the first research question, as to what the participants' reactions were to the sexual risk calculator, were encouraging. On a scale of 1-5, 1 being not very easy to use and 5 being very easy to use, the participants rated the scale 4.4(.92) in mean(standard deviation). They also found the sexual risk calculator to be very helpful in determining their risk of calculating an STD with the mean (standard deviation) being 3.8(1.04).

With the second research question, the researchers wished to investigate the participants' reactions to their risk as calculated by the sexual risk calculator. Descriptive statistics were used and the result was measured in mean and standard deviation. A scale of 1 to 5 was used;

1 equaled no surprise and 5 being very surprised at the level of risk. With regards to the participants being surprised at the risk, the result ended up being 3.1(1.39). This result indicated that on average, the participants were surprised at their level of risk of contracting an STD.

The third research question dealt with comparing the researcher's views on the participants' risk of participating in an unsafe sexual encounter and the participants' views of their risk of participating in an unsafe sexual encounter. The sexual risk calculator had three zones that a participant would be placed in due to the relative amount of risky sexy behaviors they were engaging in. The red zone was considered the high risk zone, the yellow zone was the moderate risk zone, and the green zone was the low risk zone, meaning that the participant was at a low risk of participating in an unsafe sexual encounter. Of all 18 participants, 16 stated that they had engaged in some form of sexual intercourse while 2 participants had never had sex. However, just because a participant did not engage in sexual intercourse did not mean that they could not be placed in a high risk zone because the calculator was used to determine their risk of having an unsafe sexual encounter and it was still possible for the participant to be at risk of having an unsafe sexual encounter even if they had not as yet participated in sexual intercourse.

Cross-Section Comparison of Participants' Calculations vs. the Researchers' Calculations

Participants' Calculations	Researchers' Calculation		
	Red (n)	Yellow (n)	Green (n)
RED (n)	7	0	0
YELLOW (n)	0	1	0
GREEN (n)	3	0	0
Not Sure (n)	7	0	0

The results of this table indicated that the majority of the participants did not correctly place themselves into the right category. For instance, 7 participants put themselves in the red category and the researcher's agreed with their assessment of their risk. But 3 participants put themselves in the green zone while the researchers, based on the participant's answers, would have put them in the red zone, the high risk category. 7 participants turned out to be not sure of the category they would have been in while the researchers would also have included them in the red zone. 1 participant was found to be in the yellow and the researchers agreed with that assessment. Therefore out of the entire sample population of 18, 8 participants or 44.4% correctly identified their level of risk while 10 participants or 55.6%, more than half of the sample, did not correctly identify their level of risk.

The fourth and final research question looked at the relationship between the level of risk calculated by the risk calculator and compared it with condom use at the last sexual encounter.

Comparison of Risk Level with Condom Use at Last Sexual Encounter

Researcher's Calculation	Vaginal Sex	Oral Sex	Anal Sex
RED n (%)	11 (61.1)	1 (5.6)	4 (22.2)
YELLOW n (%)	0	0	0
GREEN n (%)	0	0	0

Interestingly, all of the participants who stated that they had sex also stated that they had used a condom at their last instance of sexual intercourse. This high ratio of condom use was not expected by the researchers.

V. Discussion

This study yielded insight into the efficacy and easy of use of a sexual risk calculator designed by the researchers to increase young adults' awareness of their risk of engaging in an unsafe sexual encounter. Young adults are the age group most likely to get an STD and therefore an increase in interventions designed to improve knowledge and awareness about STD's and unsafe sex is needed.

From the data collected in this study, it was found that the sexual risk calculator designed by the researchers was somewhat helpful to the participants of the study and that it was easy to use. It was also found that the participants were moderately surprised at their level of risk.

This fact validates the information found in the literature search that there is a lack of knowledge regarding how at risk young adults are of engaging in an unsafe sexual encounter.

The research showed that participants, even with the calculator, did not accurately calculate their risk level. There two possible reasons why this result may have come about. The first is that the lack of knowledge regarding what defines a risk factor and just how at risk young adults are may be so great that even with the help of the sexual risk calculator, the participants were still unable to accurately calculate their risk of engaging in a risky sexual encounter. The other option is that calculator itself is hard to understand and caused excess confusion which would explain why so many of the participants were unable to accurately assess their risk. A combination of the two is the most likely explanation.

All of the participants who stated that had sex also stated condom use at the time of last intercourse. This finding was a surprise and was a very encouraging sign especially to researchers who work on sexual health interventions. However, it must be noted that when the researchers presented the calculator and the information packet to the participants, the researchers did state that this was an intervention designed to promote safer sex. It is possible that this statement may have influenced their answers. However the study was completely confidential and the participants were made of aware of that fact as well which would serve to increase honest answers.

There are limitations to this study. The study is still ongoing and though the current sample size was small with an $n=18$ the number of participants will increase up to 50 before the study is stopped. More research findings will be able to be determined when a greater number of

participants is achieved and as many of our findings were approaching significance but had not quite reached it yet, it is hoped that with a larger sample size, significance of these findings will be achieved

The sample, aside from being small, was also a homogenous convenient sample. It was drawn from a large mid-western state university. Most of the participants were white, female, and around 21 years of age. To make the findings more generalizable, it would be better to have a larger sample size made up of young adults ranging from ages 15-24 and to have more males and minorities included in the study.

Young adults and their sexual health is a growing area of concern among healthcare workers and researchers. They are at the greatest risk of contracting an STD and of suffering long term consequences if these STD's go untreated. It is hoped that this study will help the sexual risk calculator one day be implemented as tool that young adults or in fact anyone can use to help them make wiser decision to decrease their likelihood of contracting an STD or engaging in unsafe sexual behaviors. As always more research is needed on the topic of sexual health and how to make sexual health interventions effective in the younger population.

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